Kepelbagaian lumut jati yang didokumentasi sewaktu Ekspedisi Saintifik Jabatan Perhutanan ke Gunung Arong (September 2024) dan Taman Eko Rimba Sekayu (Oktober 2024)

Moss diversity documented during the Forestry Department's Scientific Expedition to Gunung Arong (September 2024) and Sekayu Forest Eco Park (October 2024)

A moss checklist of Sekayu Forest Eco Park, Terengganu and its surrounding areas

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Moss diversity reported for Terengganu

- To date, a total of 255 moss spesies and infraspecies have been reported for Terengganu (Yong et al., 2013; Lee et al., 2019).

- Of these, only three species were previously reported for **Sekayu Recreational Forest** and **Kuala Berang** area (Dixon, 1926; Lee et al., 2019):
  - *Mitthyridium subluteum* (Müll. Hal.) H.K.Nowak
  - *Macromitrium fuscescens* Schwagr. [syn. *M. semipellucidum* Dozy & Molk.]
  - *Fissidens javanicus* var. *integrifolius* Dixon (*nomen invalidum*: no description)

Materials & Methods

A total of **342 samples** were collected from **7 to 10 October 2024** at the following locations:

(1) Sekayu Forest Eco Park, Trail no. 1, towards **Sekayu Waterfall**

(2) Hulu Terengganu Tambahan Forest Reserve, Trail no. 2, stream bank and vicinity of **Sungai Anak Peres**

(3) Hulu Terengganu Tambahan Forest Reserve, Trail no. 3, ascend to **hill area** through **Sekayu Agriculture Park**

(4) Pasir Raja Barat Forest Reserve, Trail no. 4, access to **feeder stream banks of Sungai Berang** through an oil palm plantation at **Bukit Belukar.**

Comparison between the moss flora at **Sekayu Forest Eco Park and its surrounding areas** (current study), **Pergau Dam** (Norhazrina et al. 2020), **Ulu Gombak** (Norhazrina et al. 2018), **Bukit Bauk** (Damanhuri et al. 2008), and **Merapoh** (Damanhuri 1999)

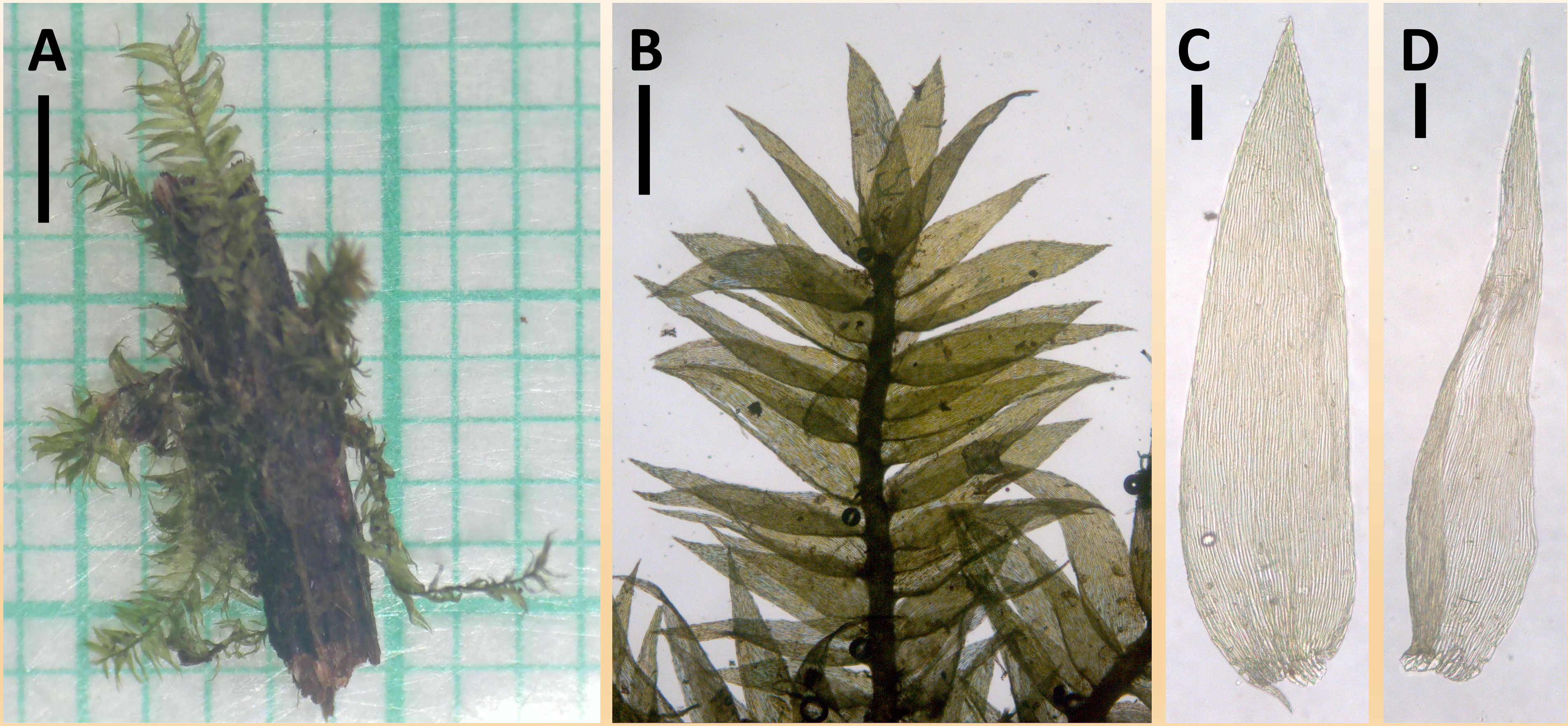
	Locality	Sekayu		Pergau Dam		Ulu Gombak		Bukit Bauk		Meropoh	
	Family	Genus	Species	Genus	Species	Genus	Species	Genus	Species	Genus	Species
1	Bartramiaceae	-	-	1	4	-	-	-	-	-	-
2	Bruchiaceae	-	-	1	1	1	1	-	-	-	-
3	Bryaceae	1	1	2	3	1	1	1	2		
4	Calymperaceae	6	22 + 1 subsp.	5	10 + 2 subsp.	5	16 + 1 subsp.	6	26	6	35 + 1 var.
5	Daltoniaceae	1	1	1	1	-	-	-	-	-	-
6	Dicranaceae	-	-	2	3	1	1	1	1	2	2
7	Diphysciaceae	-	-	-	-	1	1	-	-	1	1
8	Entodontaceae	-	-	-	-	1	1	-	-	-	-
9	Ephemeropsaceae	-	-	-	-	-	-	-	-	1	1
10	Fissidentaceae	1	6	1	5	1	6	1	7	1	6
11	Hookeriaceae	-	-	-	-	-	-	-	-	2	5
12	Hypnaceae	3	5	3	7	3	6	3	6	3	4
13	Hypnodendraceae	-	-	-	-	-	-	-	-	1	1
14	Hypopterygiaceae	-	-	1	1	-	-	-	-	-	-
15	Leptodontaceae	-	-	-	-	-	-	1	1	-	-
16	Leskeaceae	-	-	1	1	-	-	-	-	-	-
17	Leucobryaceae	1	2	2	4	1	4	1	4	1	9
18	Leucomiaceae	-	-	-	-	1	1	-	-	-	-
19	Meteoriaceae	-	-	4	6	-	-	-	-	1	1

Comparison between the moss flora at **Sekayu Forest Eco Park and its surrounding areas** (current study), **Pergau Dam** (Norhazrina et al. 2020), **Ulu Gombak** (Norhazrina et al. 2018), **Bukit Bauk** (Damanhuri et al. 2008), and **Merapoh** (Damanhuri 1999) (cont.)

	Locality	Sekayu		Pergau Dam		Ulu Gombak		Bukit Bauk		Meropoh	
	Family	Genus	Species	Genus	Species	Genus	Species	Genus	Species	Genus	Species
20	Myuriaceae	-	-	-	-	-	-	1	1	-	-
21	Neckeraceae	4	5	5	8	4	4	3	3	4	5
22	Octoblepharaceae	-	-	1	1	-	-	-	-	1	1
23	Orthodontiaceae	-	-	-	-	1	1	-	-	-	-
24	Orthotrichaceae	-	-	2	3	-	-	-	-	1	3
25	Phyllodrepaniaceae	1	1	-	-	1	1	1	1	-	-
26	Pilotrichaceae	1	1 + 1 var.	1	1 + 1 var.	1	1 + 1 var.	-	-	-	-
27	Plagiotheciaceae	-	-	-	-	1	1	-	-	-	-
28	Polytrichaceae	1	1	1	3	-	-	-	-	-	-
29	Pottiaceae	2	2	1	1	2	2	1	1	1	1
30	Pterobryaceae	-	-	2	2	-	-	-	-	2	3
31	Ptychomniaceae	-	-	1	1 + 1 var.	-	-	-	-	-	-
32	Pylaisiadelphaceae	3	6	2	4	3	5	-	-	-	-
33	Racopilaceae	-	-	1	2	-	-	-	-	1	1
34	Rhizogoniaceae	-	-	1	2	1	1	-	-	1	2
35	Schistomitriaceae	-	-	-	-	-	-	-	-	2	2
36	Sematophyllaceae	5	6	2	2	8	9	6	12	6	9
37	Symphyodontaceae	-	-	2	2	-	-	-	-	-	-
38	Thuidiaceae	2	3	-	-	2	4 + 1 var.	3	3	2	4
	Total	32	62 + 1 subsp. + 1 var.	46	78 + 2 subsp. + 2 var.	40	67 + 1 subsp. + 2 var.	29	68	40	96 + 1 var.

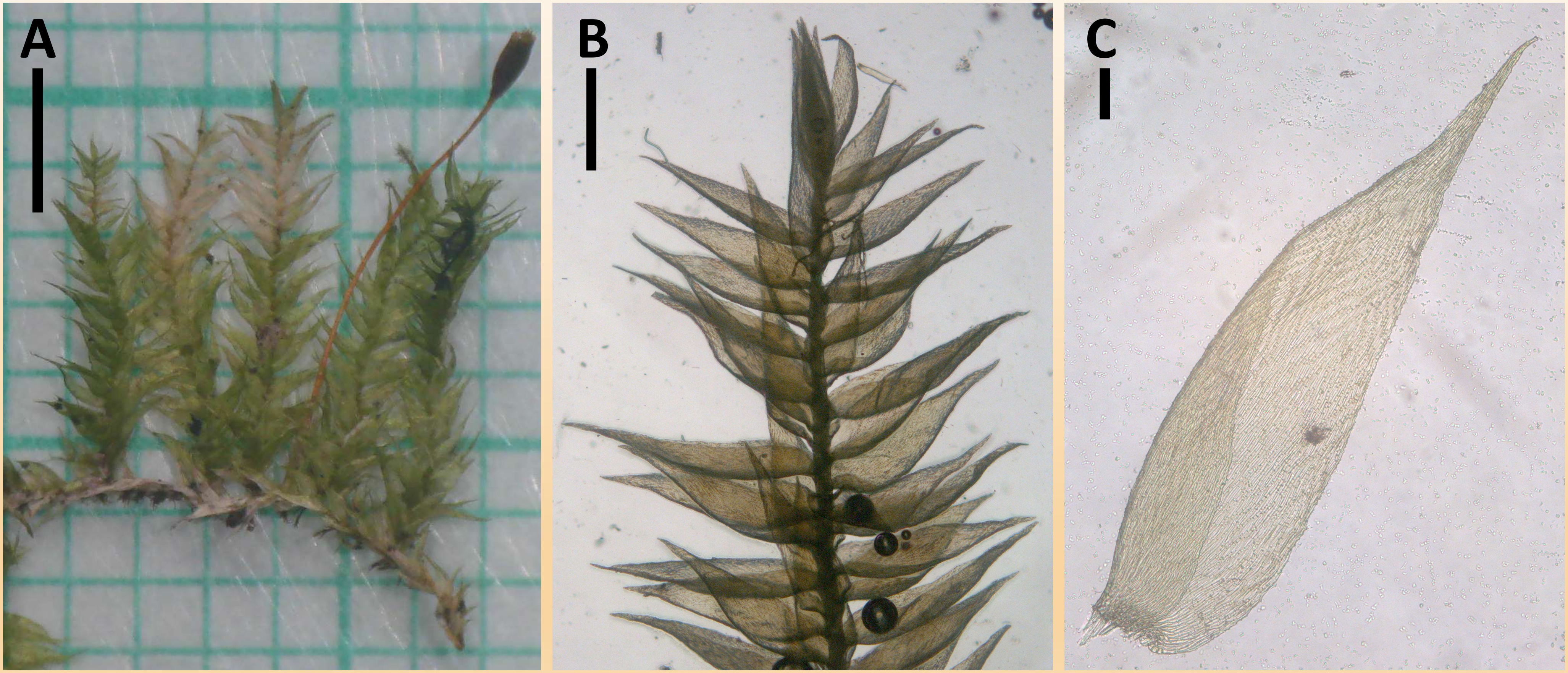
New record for Terengganu state –

Isopterygium bancanum (Sande Lac.) A. Jaeger



A: Plant (dry). B: Branch. C: Branch leaves. Scales: A = 2 mm; B = 500 µm; C & D = 100 µm.
(All taken from *Shyam 97*)

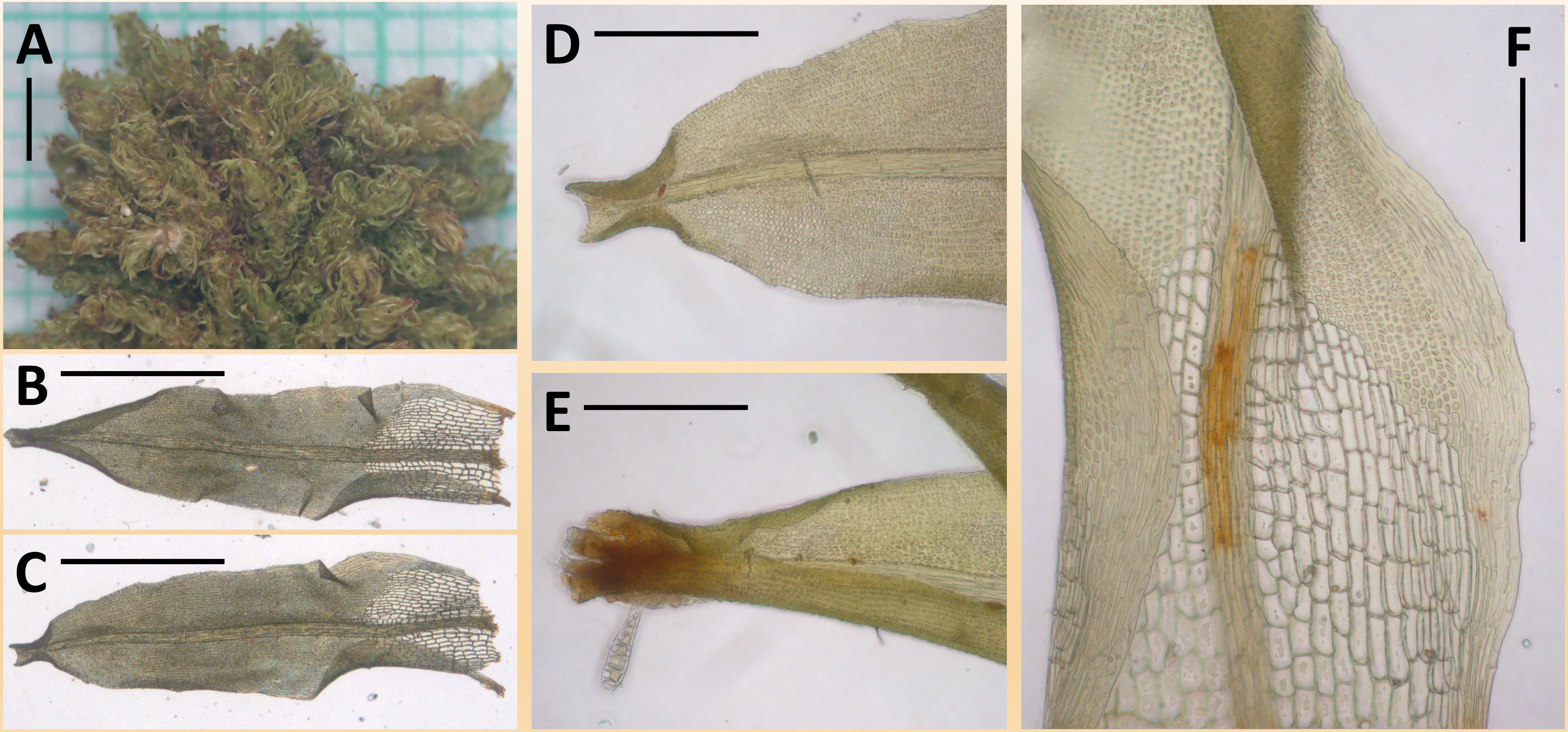
New record for Terengganu state – *Taxithelium planissimum* Broth.



A: Plant (dry). B: Branch. C: Branch leaf. Scales: A = 2 mm; B = 500 µm; C = 100 µm. (All taken from *Shyam 120*)

Interesting record –

Mitthyridium wallisii (Müll. Hal.) H.Rob.



A: Plant (dry). B & C: Leaves. D & E: Apices of leaves. F: Shoulder of leaf. Scales: A = 2 mm; B & C = 500 µm; D, E, & F = 100 µm. (All taken from *Shyam 294*)

The moss diversity of Gunung Arong, Johor and its adjacent areas

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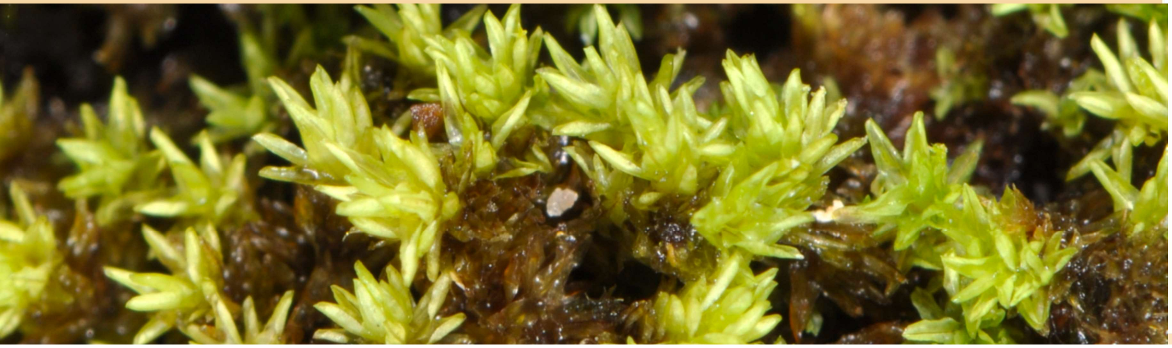
Research questions

- Diverse vegetations: beach, mangrove, freshwater swamp, peat swamp, (coastal) hill dipterocarps, quartz.
- The first bryophyte exploration to this area, with 399 specimens collected.
- Can highland species present in the lowland coastal hill?
- Riau's Pocket (Corner's or Ashton's? or none) (Kiew & Saw, 2019)



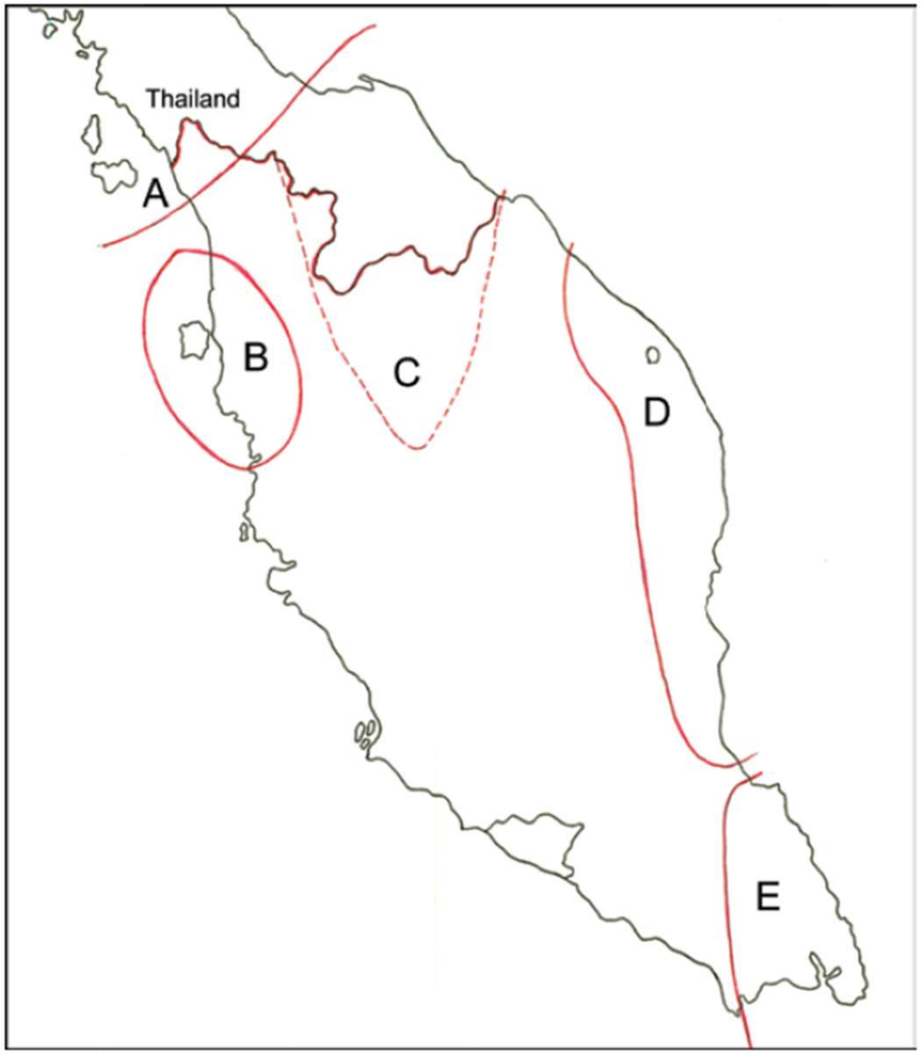


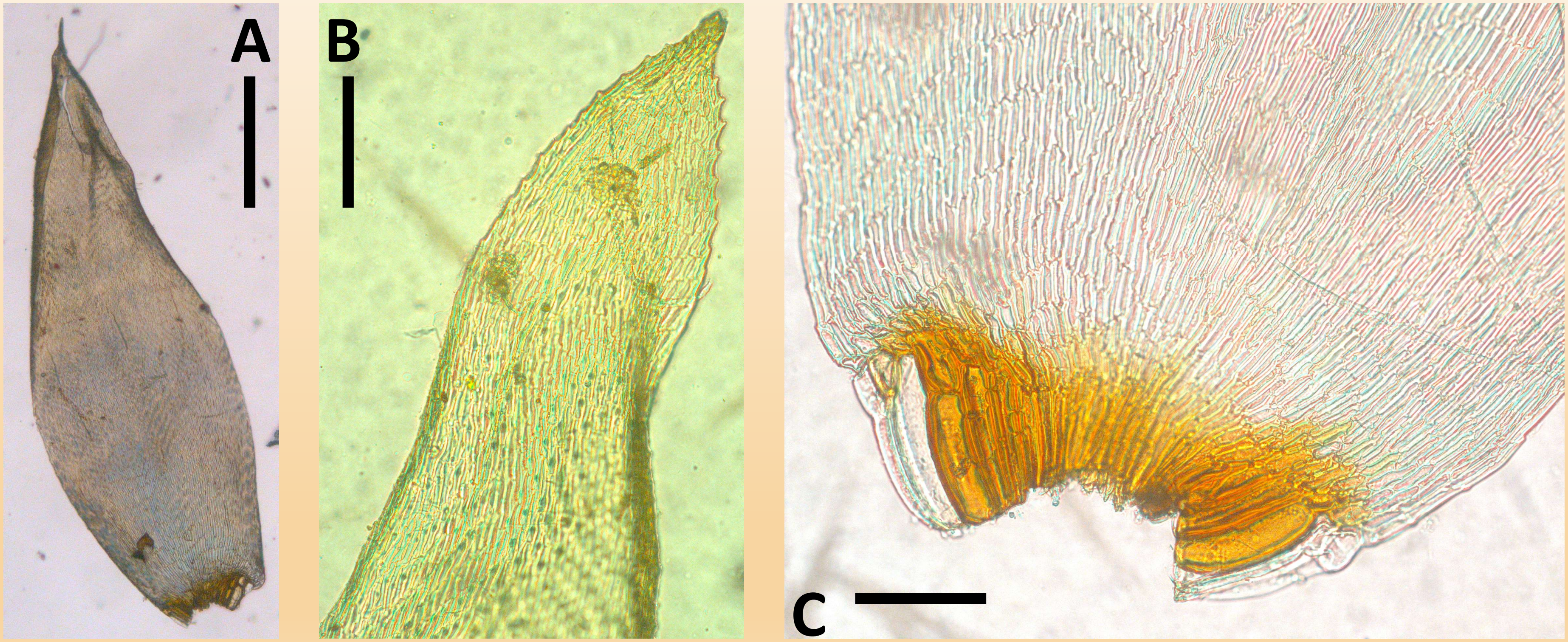
Fig. 3. Phytogeographical Provinces described from Peninsular Malaysia. **A.** Northern Province; **B.** Perak Province; **C.** Continental Intrusion; **D & E.** Ashton's Riau Pocket; **E.** Corner's Riau Pocket.

The Moss Diversity

	Family	Genus	Species
1	Calymperaceae	6	24
2	Fissidentaceae	1	10
3	Hypnaceae	2	4
4	Leucobryaceae	2	3+2 var.
5	Neckeraceae	2	2
6	Pilotrichaceae	1	1
7	Plagiotheciaceae	1	1
8	Pottiaceae	2	2
9	Pylaisiadelphaceae	3	5
10	Rhizoganiaceae	1	1
11	Sematophyllaceae	7	10
12	Thuidiaceae	1	1
	Total	**29**	**64+2 var.**

Rare occurence

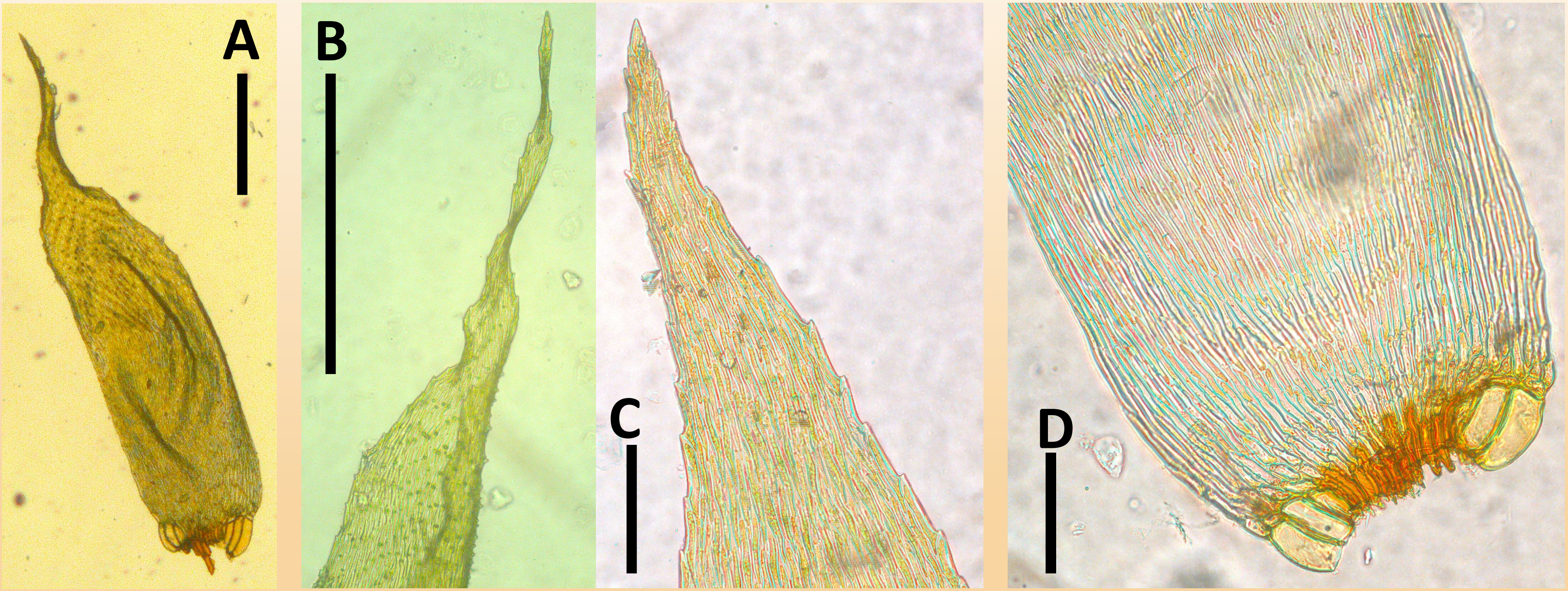
Papillidiopsis bruchii (Dozy & Molk.) W.R. Buck & B.C. Tan



A: Leaf. B: Leaf Apex. C: Basal region. Scales: A = 500 µm; B & C = 100 µm. (All taken from *Yong KT 12214*)

Rare occurence:

Papillidiopsis malayana (Dixon) B.C. Tan --Trail no. 1, 3, 12, wet area

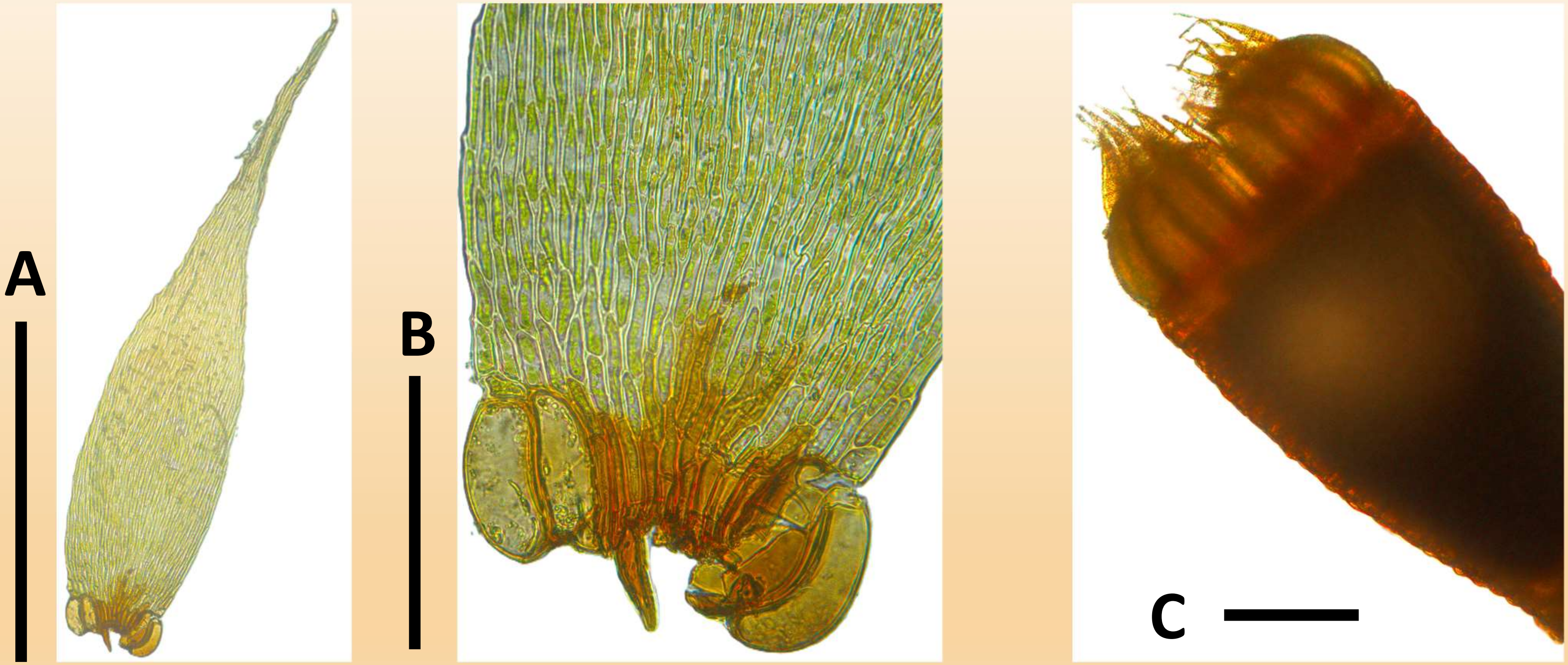


A: Leaf. B & C: Apices of Leaves. D: Basal region. Scales: A & B = 500 µm; C & D = 100 µm. (All taken from *Yong KT 12180*)

Species with restricted distribution:

Trichosteleum fleischeri B.C.Tan, B.C.Ho & Seah --Trail no. 1 & 12

-Johor & Singapore

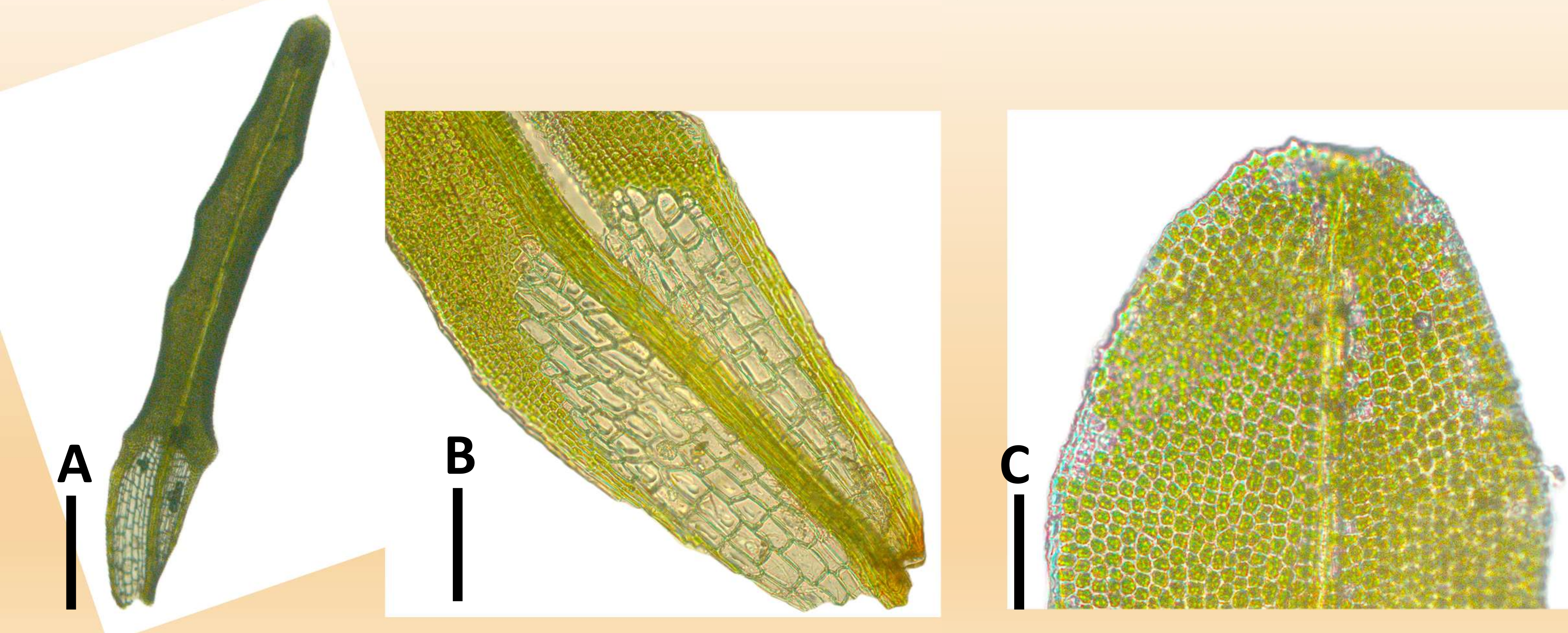


A: Leaf. B: Basal region. C: Capsule. Scales: A = 500 µm; B & C = 100 µm. (All taken from *Yong KT 12362*)

Species with restricted distribution:

Syrrhopodon semperi Müll. Hal. --Trail no. 1, Tasik Labong Catchment.

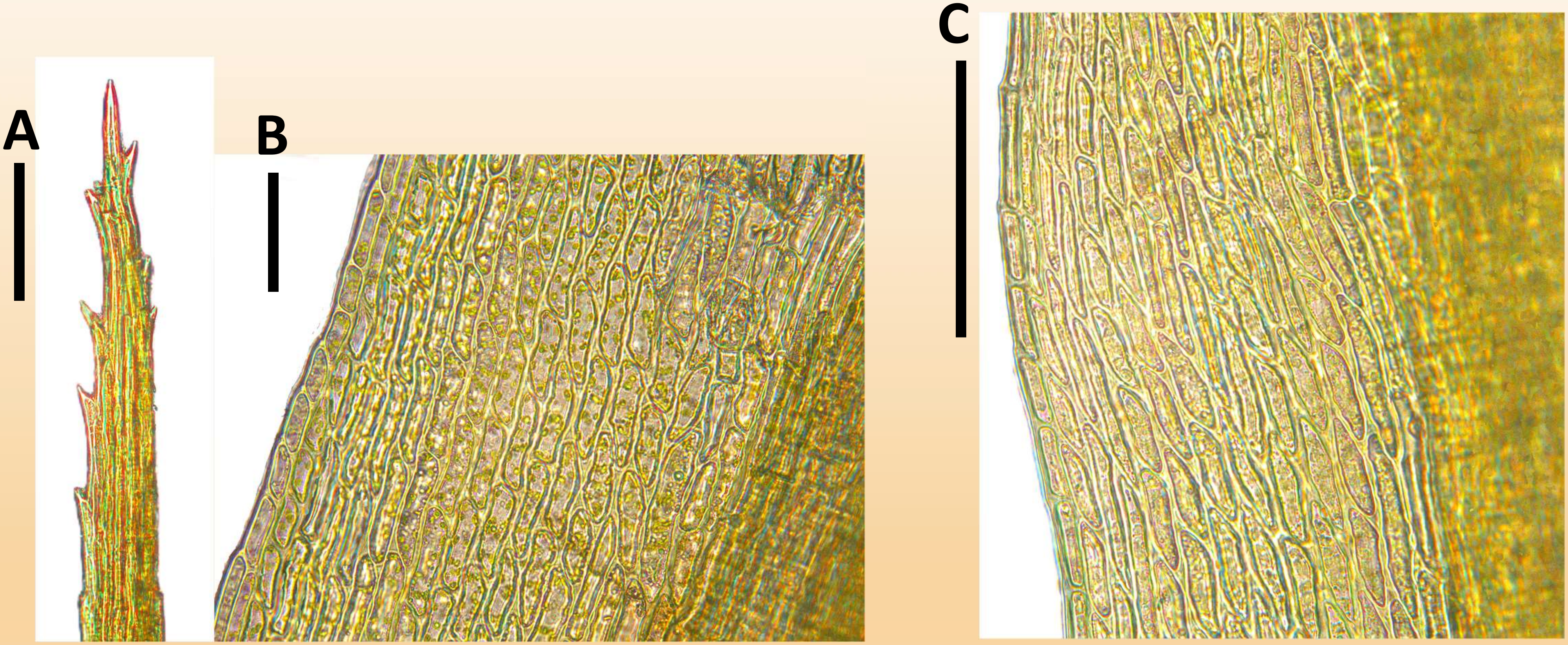
-Penang & Johor; 2nd record in Peninsular Malaysia



A: Leaf. B: Leaf shoulder. C: Leaf apex. Scales: A = 500 µm; B = 100 µm; C = 100 µm. (All taken from *Yong KT 12372*)

Interesting record (elsewhere highland):

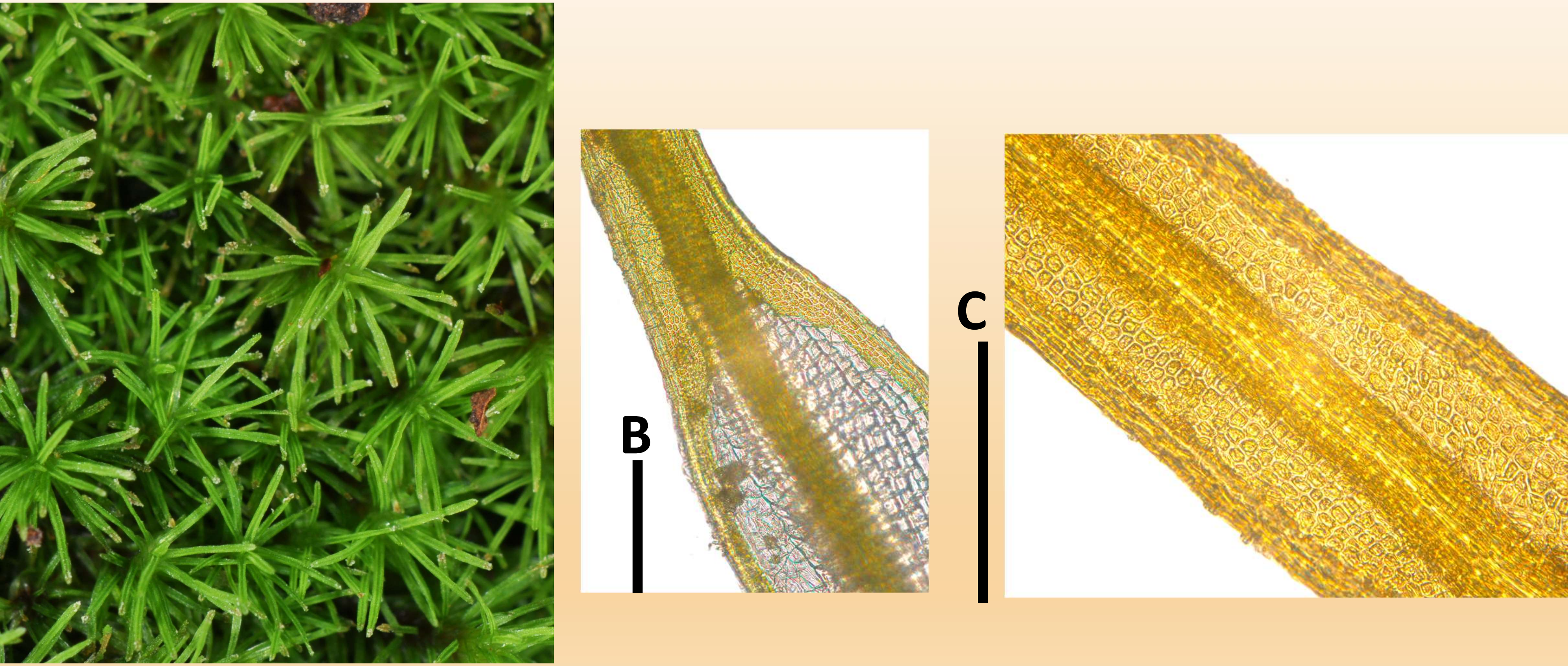
Campylopus ericoides (Griff.) A.Jaeger --disturbed, peat swamp (Trail no. 11)



A: Leaf apex. B: Basal laminal cells. C: Upper laminal cells. Scales: A = 100 µm; B = 50 µm; C = 100 µm. (All taken from *Yong KT 12395*)

Interesting records (elsewhere highland):

Syrrhopodon prolifer Schwägr. --lowland dipterocarp forest, between the swamp forests (Trail no. 12)



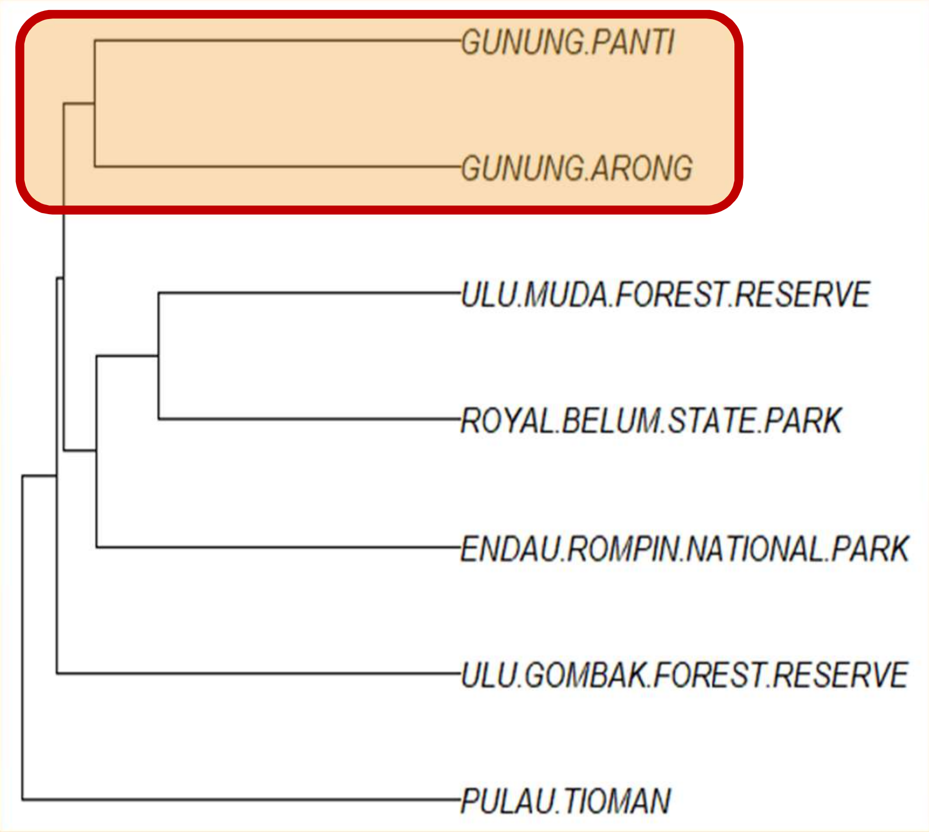
A: Plant. B: Leaf shoulder. C: Median part of Leaf. Scales: B = 50 µm; C = 100 µm. (All taken from *Yong KT 12089*)

	GUNUNG ARONG		PULAU TIOMAN		GUNUNG PANTI		ROYAL BELUM STATE PARK		ENDAU-ROMPIN NATIONAL PARK		ULU GOMBAK FOREST RESERVE		ULU MUDA FOREST RESERVE	
GUNUNG ARONG	**67**		28		43		40		55		34		44	
PULAU TIOMAN	21.71	35.67	**90**		35		45		52		37		52	
GUNUNG PANTI	40.57	57.72	25.55	40.70	**82**		53		62		39		49	
ROYAL BELUM STATE PARK	31.50	47.90	31.03	47.37	41.09	58.24	**100**		64		44		71	
ENDAU-ROMPIN NATIONAL PARK	35.71	52.63	28.89	44.83	38.27	55.36	35.96	52.89	**142**		53		79	
ULU GOMBAK FOREST RESERVE	33.01	49.64	30.08	46.25	34.51	51.32	34.92	51.76	33.33	50.00	**70**		48	
ULU MUDA FOREST RESERVE	33.08	49.72	35.14	52.00	34.27	51.04	51.08	67.62	45.66	62.70	36.36	53.33	**110**	

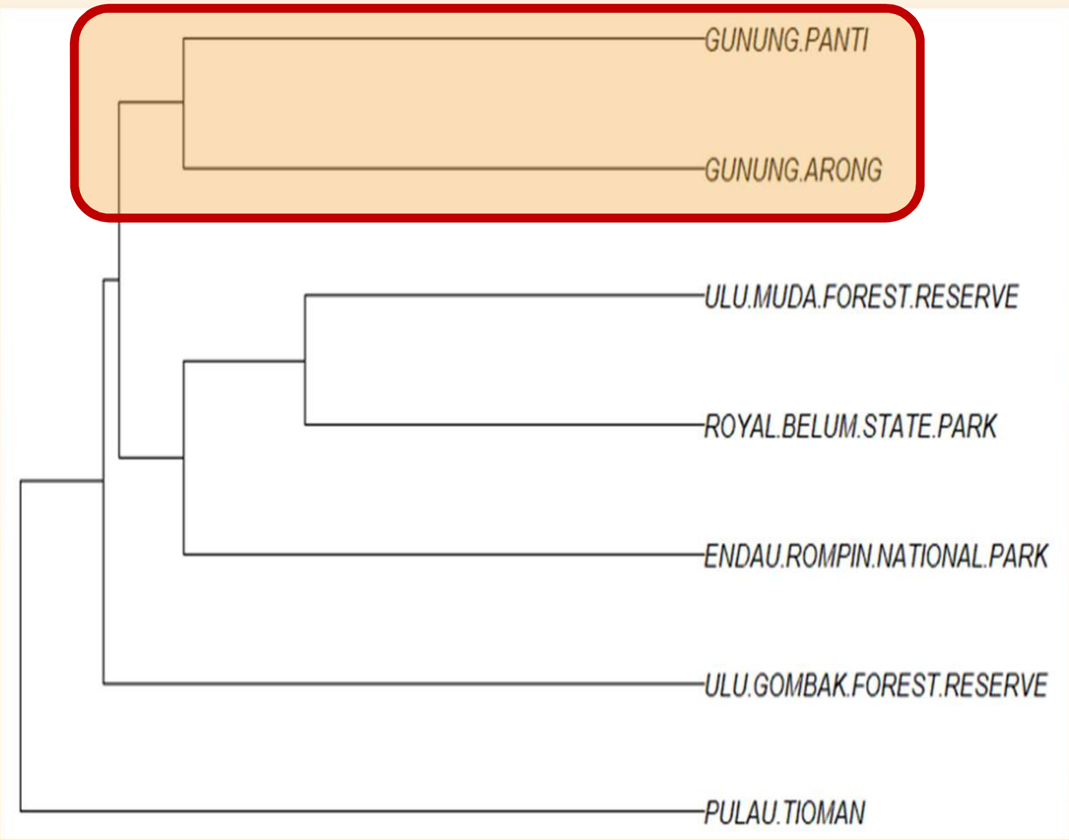
🟦 **Jaccard Similarity %**

🟧 **Sorenson Similarity %**

Jaccard Similarity Index


GUNUNG.PANTI
GUNUNG.ARONG
ULU.MUDA.FOREST.RESERVE
ROYAL.BELUM.STATE.PARK
ENDAU.ROMPIN.NATIONAL.PARK
ULU.GOMBAK.FOREST.RESERVE
PULAU.TIOMAN

Sorenson Similarity Index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GUNUNG.ARONG
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ROYAL.BELUM.STATE.PARK
ENDAU.ROMPIN.NATIONAL.PARK
ULU.GOMBAK.FOREST.RESERVE
PULAU.TIOMAN

Conclusion

- A total of **62 species and 1 subspecies and 1 varieties, in 32 genera and 14 families** were reported for Sekayu Forest Eco Park and its surrounding area; 2 new species records for Terengganu.
- A total of **64 species and 2 varieties, in 29 genera and 12 families**, were reported for Gunung Arong and its adjacent areas; a number of rare and interesting records.
- Presence of some highland species in the lowlands.
- "Riau Pocket" may not apply to bryophytes; need further verification.

TERIMA KASIH